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A Case Study

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Classification and framing in PBL: A Case Study

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Abstract

Problem-based and project organized learning is increasingly gaining traction as a pedagogical model suitable for supporting transversal competencies. Characterized by starting the learning process in authentic and exemplary problems, students at Aalborg University (AAU) engage in lengthy project-organized PBL often spanning an entire semester. The curriculum of each semester is organized in thematic blocks consisting of a large project supported by smaller individual disciplinary subject courses. The integration of the disciplinary subjects in the project is, is however, debatable. Answers from a survey distributed to 5th semester Medialogy students show that students found it challenging to integrate course content into their projects in the previous semester. Some students even found the course content irrelevant to their projects. In other words, a dissonance exists in the perceived relation between content presented in courses and content applied in projects. The situation has implored teachers to rethink the curriculum and pedagogy on the 4th semester of Medialogy.

Applying Bernstein's concepts of classification and framing as an interpretive framework to interviews with teachers and semester descriptions, we will analyze the classification and framing at this re-thought 4th semester. Classification conceptualizes the insulation between subjects and contents and framing the structuring of pedagogic communication such as pacing and sequencing. Specifically, we investigate how classification is described in the formal curriculum and in interviews with teachers. Further, we will briefly analyze how teachers reflect on the framing of the courses and projects. Bernstein's concepts of classification and framing appear to be useful when addressing the assimilation and levels of control of subjects and projects in project-organized problem-based learning.

Keywords: Problem-based learning, classification, frame, engineering education, Bernstein

Type of contribution: PBL research

1 Introduction

Introductions to research on problem-based learning (PBL) often hail the pedagogical model as an innovative approach to student-centered learning. The approach emphasizes student autonomy within a variety of confinements, be it structured problems or vast and complex possibilities of ill-structured, wicked, and interdependent fields of problems (Kolmos & de Graaff, 2013; Savin-Baden, 2014).
Central to the exploration is a social aspect where peers in groups of varying sizes inquire into specific authentic problems, some in a manner of weeks, others in months. Suffice to say, PBL exists in many different guises, all sharing some central components (De Graaff & Kolmos, 2003). Many of the learning activities unfolding in PBL are hidden from supervisors, particularly in those models of PBL, where project-organization is a corner-stone. Here, individual subject courses are intended to support and expected to be included in the projects. There is, however, evidence to suggest that the integration of course content in projects is proving difficult for some students.

During an aide to teaching staff in the process of re-organizing a semester on Medialogy at Aalborg University (AAU), researchers found that students struggle to identify the relevance of individual courses in relation to projects. The students also had difficulties with the sequencing of the subjects in courses, some stating that it seemed off compared to status in projects as well as with transferring course-content (L. B. Kofoed et al., 2019). Some courses however, seemed easier to integrate, and students attributed this to what, in essence, are Didaktik considerations, where the subject-matter is presented in a practical and relatable manner to projects (p. 1474). The authors note that the students' perceived disjunction between courses and projects cannot be isolated to a single semester, but could be habits formed over previous semesters (p. 1478). The integration of course content into projects are central to the AAU PBL model (Askehave et al., 2015), and the experienced disconnect points to an area in need of further research. In line with Kelly (2004), the authors suggest a holistic approach when developing a curriculum with the intended union of courses and projects (L. B. Kofoed et al., 2019). By revisiting qualitative interviews conducted by members of a cross-faculty research project called PBL Future, we will analyze the collected data at 4th semester Medialogy, by applying Basil Bernstein's concepts of classification and framing (B. B. Bernstein, 1996). For some, it may seem like a counter-intuitive choice, as Bernstein was a vocal critic of progressive education because of its invisible pedagogy. However, Bernstein was no theoretical purist and called such approaches 'epistemological botany' (Moore, 2013, p. 5).

Our aim with this paper is then to apply a set of conceptualizations presented by Bernstein. In the following, we will outline the previously conducted research and background, then outline the theoretical framework of classification and framing, and finally apply it to the qualitative interviews and curriculum data. We are, in other words, spectating with different interpretive frames than what the data has previously been subjected to (Charmaz, 2014).

2 Background

Before presenting the theoretical framework, we will outline how the data was collected and the original rationales surrounding the collection. We do this both to acknowledge the work conducted by our colleagues and to add transparency to our process. PBL Future is, as mentioned earlier, a cross-faculty research project addressing different aspects and potentials of the institutional and systemically practiced

PBL model at AAU (Kolmos et al., 2019). PBL Future consists of four distinct subprojects and a baseline study, researching topics such as self-directed learning, flipped semester, and post-digital collaboration, to name a few. This paper is a collaboration between members of the baseline study and the subproject researching a flipped and integrated semester structure.

The subproject that originally collected the data from students and teaching staff and initiated the flipped learning approach, was motivated to do so by empirical data from previous students on the semester, that stated that further integration of the courses into the project work would be an improvement (Kofoed et al., 2018; Kristensen et al., 2020). These difficulties with integration at AAU have previously been highlighted as a consequence of the 2011 decision to require all courses to have stand-alone exams, replacing the earlier system which allowed for courses to be examined through the project exam (Hüttel & Gnaur, 2017). Flipped learning methods was chosen to mitigate these problems as these have previously shown to provide students with an opportunity for increased interaction and a deeper involvement and engagement with course material (Johnson et al., 2015).

3 Data collection

The data used in this article is, because of the cross-faculty collaboration, a collection of both baseline data and data from the flipped and integrated semester. Data from the flipped and integrated semester is the base of the analysis. The flipped and integrated semester is a research project acting on the concerns of organizational and structural integration problems within the AAU PBL-model. In co-creation between teachers at 4th semester Medialogy (AAU CPH) and the research team, an experiment of applying a flipped classroom approach in all three courses at a semester and focusing on in-class activities that integrate course material and the semester project work has been running first time in the spring 2019 and is running again in spring 2020. For data collection an explorative case study approach (Remenyi, 2013) has been used. Research methods such as observations, student surveys and teacher interviews have been used give insights into different aspect of this new flipped and integrated semester. In this paper we will only analyze five semi structured interviews, one with each of the teachers at the 4th semester of Medialogy. The interviews were conducted in the spring of 2019 and is part of the first iteration of the new re-organized semester design. The interviews have an average length of 35 minutes and have been transcribed and coded (Kristensen et al., 2019). The thematic codes used for this analysis is explicit examples of classification and framing as they emerge during the interviews.

4 Theoretical Framework: Classification and framing

Educational knowledge is, according to Bernstein (2003) realized through three intertwined message systems; a curriculum that defines what counts as valid knowledge, a pedagogy that constitutes what is considered a valid mode of transmission of knowledge, and lastly, evaluation defining a valid realization of knowledge is (p.77). The rules and principles for the selection of content, pedagogy, and evaluation can be drawn together as an 'educational knowledge code.' Bernstein described two general types of curriculum based on the relation of contents, either as closed or open. In the former, the content is 'well-insulated,' meaning the boundary of the content is clear-cut. In the latter, there is, on the other hand, reduced insulation, where the boundary of content is blurred. Bernstein (2003), respectively, call these a collection type or an integrated type, both with different variations on this horizon. Each of these is transmitted by a peda-

gogical device affecting the potential pedagogical discourses (1996). This pedagogical discourse is an oscillating 'struggle' between an 'official recontextualization field' (ORF) governed by state and allied agents, and a 'pedagogic recontextualization field' (PRF) governed by teaching staff.

Collection types and integrated types is organized in distinct ways with different levels of rules, student autonomy, hierarchies, and establishments of subject loyalty. The collection type is a highly specialized curriculum with clear subject boundaries. The relation between teachers and students is hierarchically organized, with little room for student autonomy. Education is here a slow initiation into the mystery of the subject, where students learn more about less. In the integrated type, the emphasis is on education in breadth. For the integration to work, the supra content must focus more on general ideas than in the collection type. The integration also affects staff relations, who must establish consensus for the integration and blurring of content boundaries (B. Bernstein, 2003; B. B. Bernstein, 1996). This can be related to potential knowledge gaps in PBL, where breadth is sacrificed for depth (De Graaff & Kolmos, 2003), but where the exemplary dives ought to be 'a mirror of the whole' (Wagenschein, 2015). The insulation has apparent consequences for the organizational structure of the university. In a collection type, the hierarchy also presents in the relationship between staff and Principal and typically manifested as a traditional top-down power structure - as we also saw in the pedagogical relationship. In the integrated type, the power distribution is more complex and divided between networks establishing alternative power bases. Relating this to a Danish context, one could be critical of the notion of PBL universities (or any university) as an integrated type from a Bernsteinian perspective because of the structural changes following the University Law of 2003, where a more corporate approach to running the Danish universities was put in place (Wright & Ørberg, 2008). Consequently, increasingly opaque and hierarchically organized management was put in place instead of the complex constellations of collaborative networks proposed by Bernstein. This has been further bolstered by the process of standardization and outcome descriptors, moving from academic subject mastery to intended learning outcomes (Bologna Working Group on Qualifications Frameworks, 2005; Karseth, 2008).

4.1 Classification and Frame

To analyze the types of curriculum, Bernstein (1973) introduces the concepts of classification and frame (see figure 1).

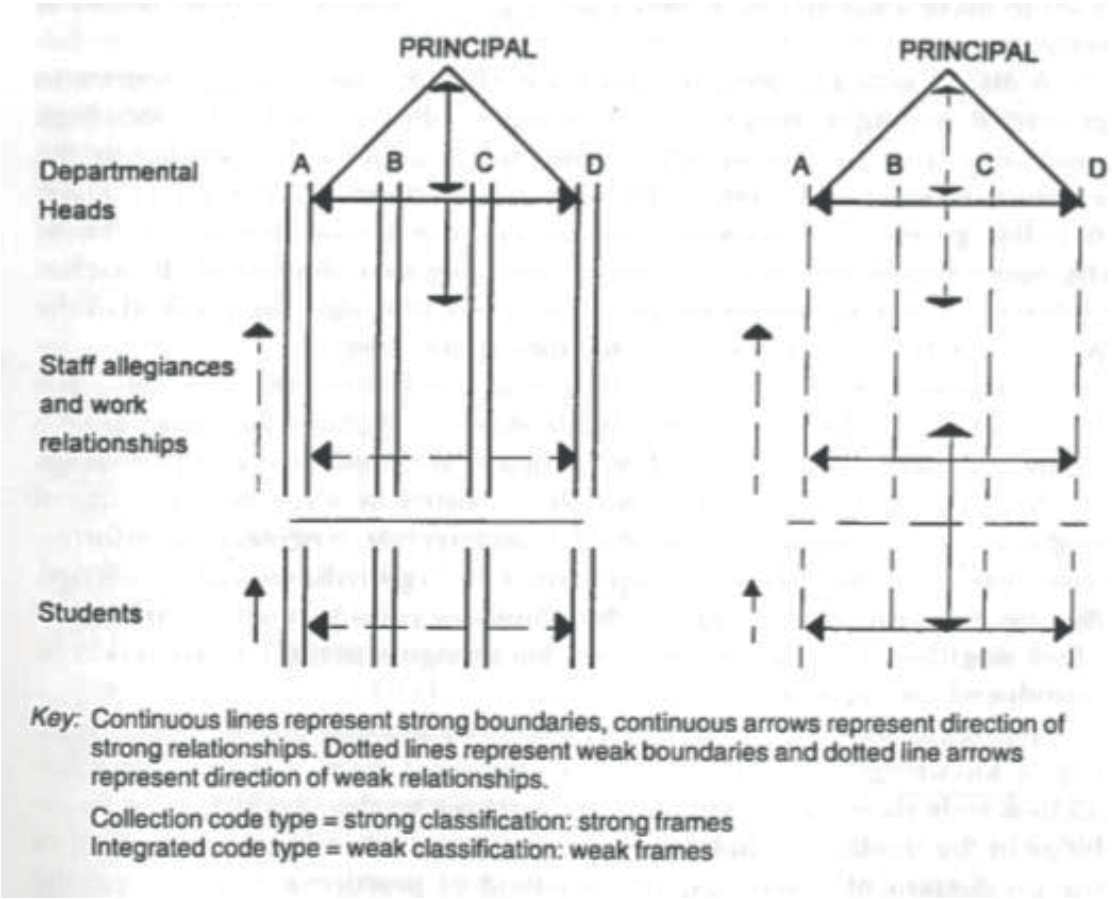

Figure 1 Strong and weak classification (B. B. Bernstein, 1996, p. 24).

Classification refers to relations between content or categories and the degree of insulation, and how these boundaries are maintained. A strong classification delineates clear boundaries, whereas a weak classification refers to blurred boundaries between categories. Insulation serves two functions, one external to the individual and one internal, by which disciplinary identity is created. Classification is then a question of power, and changes in the classification reveal these power relations. Any changes in the classification result in changes in what is perceived as a unique identity, be it gender or discourse, to name a few. Parting in a discussion of the trivium and quadrivium curriculum of old European universities (see for instance Doll, 2012; Muller, 2009 for discussions on the periodical transition of the liberal arts and practical knowledge in the trivium and quadrivium), Bernstein (1996) argues that discourses exist as both singulars and regions. For educational researchers, this notion provides a way of understanding educational subjects as singular discourses and an educational program as a region (1996, p. 23). A region is an appropriated space, previously empty, given a unique name. A collection of singular discourses set within a strong classification serves a regionalization of knowledge. This process requires recontextualization of discourses when determining which are suited for the new region, and is a place of ideology (1996, p. 23). As we shall later see, this aspect is particularly relevant when teachers evaluate the scope of projects in PBL, as some students may traverse to peripheries of accepted discourse and perhaps beyond.

Frame refers to the pedagogical relationships between teacher and taught. Classification address the limits of *what* discourse to include, framing address the potential pedagogical realization of the selected dis-

course (B. B. Bernstein, 1996). Framing is then about apparent control, of who controls what, be it 'selection, organization, pacing, criteria of communication and the position,' to name a few (B. B. Bernstein, 1990). Strong and weak frames respectively limit or enhance options for the teacher and taught when regulating the features that constitute the communicative context and the realization of potential pedagogical discourses (B. B. Bernstein, 1990, 1996). Analytically, framing serves as a regulator of two intertwined systems, but their rules can change independently of each other; rules of social order and discursive order. The rules of social order are constituted by what we previously presented as the pedagogical relation, excepted behavioral traits, or vocational ambitions. The rules of the discursive order are composed of the 'selection, sequence, pacing, and criteria of the knowledge.' Bernstein (1996) also refers to these rules as regulative discourse and instructional discourse (p. 28). When framing is strong, the pedagogy is visible, and in the opposite case, invisible to the student, or what Bernstein sarcastically denotes as a 'progressive' framing.

Nonetheless, the two rules form the pedagogical discourse, and as it moves from one ‘site’ to another, a transformation takes place. Bernstein (1996) reformulate the pedagogical discourse to a principle of recontextualization 'which selectively appropriates, relocates, refocuses and relates other discourses to constitute its own order' (1996, p. 47). The principle thus creates agents with recontextualization functions, moving the pedagogic discourse to recontextualization fields mentioned earlier, which plays a crucial role in the autonomy of education as a whole.

5 PBL Principles, Classification, and Framing

Relating the concepts of classification and framing requires us to delve briefly into the overarching principles of PBL (De Graaff & Kolmos, 2003; Guerra, 2017). The most evident is the centrality of the problem as the vehicle for learning. The learning processes are student-centered, social and experiential in nature, drawing on knowledge of the individual student and peers (Baden & Major, 2004). The student-centrism requires self-direction in the learning process, and, tying a knot to Bernstein (1990, 1996), an ability to find and establish a classification between courses and acceptable discourses. The students themselves in the less visible pedagogy of PBL, becomes agents in the field of recontextualizing and transforming a pedagogical discourse with their own, in essence creating a new region of discourses. The vital part on the supervisor is then to secure a sense of coherence between the disciplinary discourse accepted by practitioners, and the 'newer' region of assembled discourses created by students. If the discourse is outside the realms the accepted and established region, the students are venturing from the accepted classification that creates a unique identity in effect weakening the established classification (B. B. Bernstein, 1996).

6 Analysis

Both classification and framing are viable concepts when planning and analyzing a PBL curriculum. For this purpose, we will analyze a single semester undergoing significant changes on a university with systemic integration of PBL. First, we will analyze the classification as presented in the formal curriculum, and the courses that are intended to support the students’ project work. Issues of pacing and sequencing from a student perspective has previously been described by Kofoed et al. (2019).

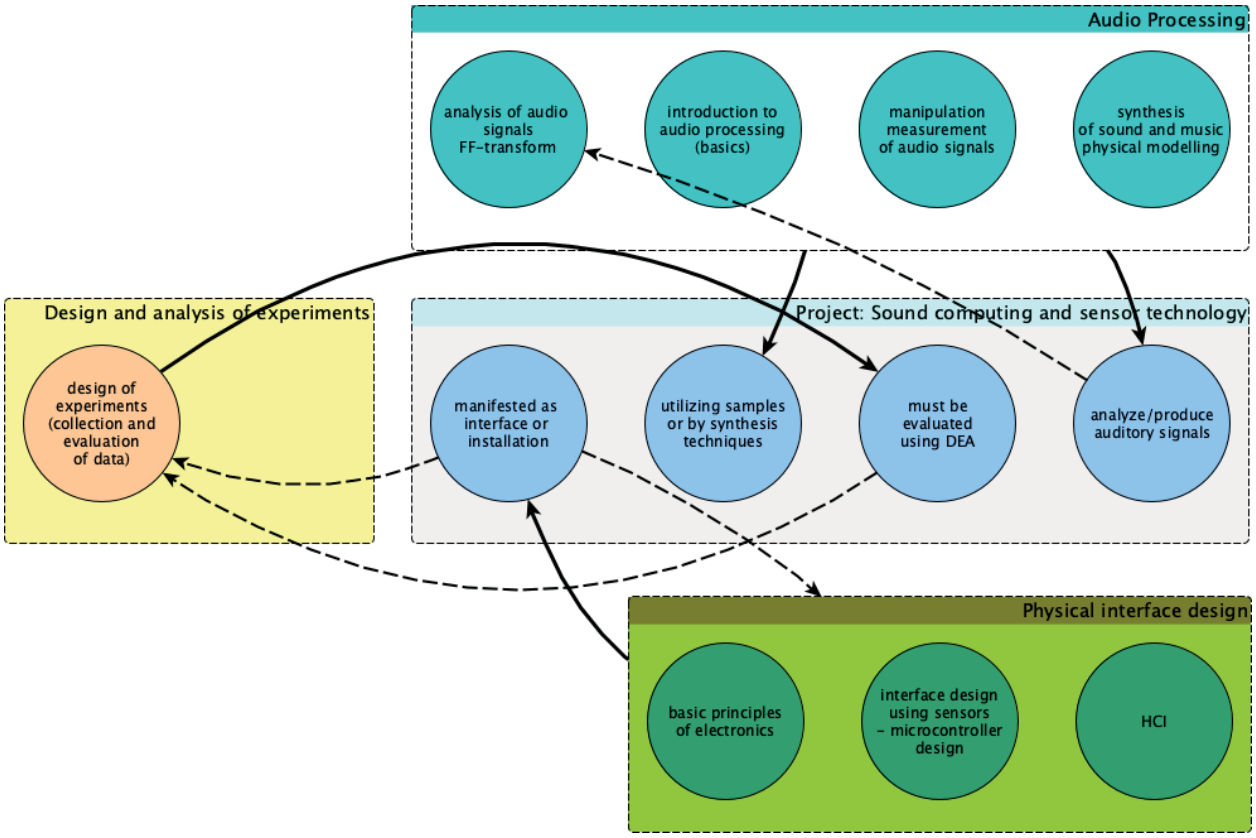

Figure 2 Classification between courses on 4. semester (based on educational goals from the formal curriculum for Mediology Aalborg University, Copenhagen 2017)

Figure 2 shows a graph of the relations between courses and project. At this particular semester, there are three courses, 'Audio processing' (AP), 'Design and analysis of experiments' (DEA), and 'Physical interface design' (PID). Courses are, according to the AAU PBL model, intended to support projects set within a semester theme (Kjersdam & Enemark, 1994), here 'Sound computing and sensor technology' (SCST). The courses and project are thematically summarized with distinct topcis in each circle. The topics are based on the broad intended outcomes stated in the formal curriculum. The dotted lines moving from SCST to the courses are the stated outcomes supported by courses, showing an outward relation from the outcomes of the project to the courses. The other edges delineate a relation between outcomes of courses and outcomes of the project. One example: In SCST, students' are expected to develop a manifestation or installation enabling users to utilize a physical interface to manipulate sound or synthesis in one way or another. This must be evaluated by planning and conducting an experiment. As each course supports these intended outcomes of the project, the boundaries between project and courses are, on paper at least, blurred. But as the graph (figure 2) shows, there is no apparent relation between courses. Although classification between projects and courses are weak and the relation reciprocal, the classification is in this graph stronger between courses. Despite the explicit statements and the at-glance weak classification, Kofoed et al. (2019) still find that students still struggle to integrate course content in projects, and, to paraphrase Bernstein, venture so far from the established discourse, that they almost create a new one.

7 Analysis of interviews

Looking at the classification within the enacted curriculum through the scope of interviews with teaching staff and going in to the case of 4th semester Medialogy we see that the teachers, despite the weak classification at the intended level of the curriculum, experience their respective courses as being isolated. They experience a strong classification between courses and semester projects in the enactment. Despite being a group of only five teachers working together on the 4th semester, the teachers are not usually coordinating or working much together:

> *"I don't remember talking to anyone about what is happening on the other courses, although it was the same people organizing the courses. We didn't talk, I didn't know what was happening. Now I have a much clearer idea of what is going on in the other courses."* (Teacher A: 19.39)

Teachers did not have a structured meeting culture and the responsibility of practical coordination concerning the semester falls upon the semester coordinator. Thereby, the classification in the enacted curriculum is much stronger than described in the intended. An attempt to mitigate this was made as a part of the new structure of the semester, by reorganizing the teaching staff into networks, an aspect also noted as vital by Bernstein (1996) for the integrated curriculum type.

Multiple initiatives have been made to support the weakening of the classification between courses and projects on the 4th semester. The research team coordinated meetings with the teacher team and put themes of integration on the agenda. Themes such as knowing each other's courses and discussing the students' work with the semester projects and more framework orientated planning of the semester was discussed.

Weakening the classification between courses and projects was also attempted by using exercises in the courses, as an interviewee explains:

> *"In PID we started every lecture with something like, use the sensors that you plan to use or that could be used in your semester project and do the exercises from there. […] The goal was established by us, using elements that they know they will use or hope they will use in their semester project."* (Teacher B, 18.30).

Working with framing as a part of weakening the classification was also done in different ways. A range of activities were planned to blur boundaries of course content and projects. One example is joint supervision of projects. Similarly, a joint workshop week was planned to reach the students at a certain point in the sequence of courses to facilitate the potential integration of the students' work thus weakening the perceived classification of courses.

> *"Another thing is that we aim for a particular framework and knowledge level between PID an AP. We aim for a particular time framework to gather all the information together so it can be connected – the week 15 workshop."* (Teacher A. 12.19).

The teachers tried to create a suitable framing for the students, where specific activities were intended to facilitate potential integration of subject matter into projects. Teacher A says:

> *"what helped was at the joint supervision day we got an idea about the different requirements so every time we had a topic in the lectures that might help the projects we highlighted them. That was a positive part"* (13.23).

The excerpt serves as an example of the intertwinement of classification and framing; certain points in the framing of the sequence of learning activities served to weaken the perceived strong classification between course contents and project. However, in a learning environment emphasizing high degree of student autonomy not all groups were in the same part of the anticipated sequence. The pace of the individual groups was not aligned, and at the joint workshop this became a problem.

8 Discussion

In this article, we have attempted to operationalize two concepts developed by Bernstein. Our ambition has been to elaborate on the potentials for analyzing various elements constituting an 'educational whole' in PBL. Rather than broad types and variations of PBL (Baden & Major, 2004) or modes of universities and curriculum orientations (Kolmos, 2017), we propose the conceptualizations presented are relevant across multiple variations of PBL, emphasizing a holistic approach when aiming for integration of subject content and teaching activities. This requires a collaborative effort and complex power distributions in networks, and as one interviewee responded, hitherto, this has not been the case. Noted by Bernstein (1996), this is a pivotal part of an integrated curriculum type. In some sense, then, the invisible pedagogy of progressive education criticized by Bernstein not only affect students but unintentionally leave teachers in the dark. Further, formulating explicit outcomes intended to aide the students in setting an acceptable trajectory fails to do so in a satisfactory manner (Kofoed et al., 2018). Consequently, a collaborative effort of integration set in a student-centered teaching environment cannot be reduced to teaching-staff or researchers alone. Instead of changes in responsibility of teaching and learning (Steiner-Khamsi, 2009), participatory and collaboratory networks of students, teachers, and researchers co-create suitable classification and framing

In a PBL environment like the one analyzed in this article, much of the learning is dependent upon the project and the students' engagement in it, which is why it is so essential to ensure as much alignment between the intended integration of courses and project and the enacted. This has been the biggest motivation for trying to operationalize Bernstein's theory and apply it, and we feel that there is a great potential for doing these types of analysis, gaining valuable insights across many different intertwined elements that impact intended, enacted and experienced learning. There are many other theoretical elements from Bernstein that we feel could be applied to great benefit of the research community, analyzing the discourses of different courses, the pedagogical device etc.. We also feel that this type of analysis should be expanded to cover not only the intended and enacted levels of the curriculum as we have done here, but also how it is experienced by the students.

9 Acknowledgements

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